CLAIMS

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A facility-wide communication system comprising:

one or more control modules,

the one or more control modules including:

a signal processor;

one or more interface connector ports; and

a plurality of signal lines connected from the signal processor to the one or more interface connector ports,

wherein signals are received via the one or more interface connector ports for processing by the signal processor and retransmitted via the one or more interface connector ports.

2. The facility-wide communication system as claimed in claim 1, the one or more interface connector ports further including:

a connection to a transceiver;

a serial communication port connecting to another one of the one or more control modules,

wherein the signals received via the transceiver can be transmitted via the serial communication port to the another one of the one or more control modules, and the signals received from the another one of the one or more control modules via the serial communication port can be transmitted via the transceiver to propagate the signals within a desired range of area.

3. The facility-wide communication system as claimed in claim 1, the one or more interface connector ports

further including:

a second serial communication port connecting to the transceiver,

wherein the signals can also be received and sent to the transceiver via the second serial communication port.

4. The facility-wide communication system as claimed in claim 1, the one or more interface connector ports further including:

a third serial communication port connecting to one or more peripheral devices,

wherein the signals transmitted and received by the signal processor can be monitored at the peripheral devices via the third serial communication port.

5. The facility-wide communication system as claimed in claim 2, wherein the transceiver includes a radio frequency transceiver.

6. The facility-wide communication system as claimed in claim 2, wherein the connection to a transceiver includes a plurality of connections to a plurality of transceivers, each of the plurality of transceivers enabled to be tuned to a different frequency channel from the rest of the plurality of transceivers, wherein the plurality of transceivers can receive signals of multiple frequencies.

7. The facility-wide communication system as claimed in claim 2, wherein the one or more control modules are connected to the another one of the one or more control modules via the serial communication port using a twisted-pair cable.

8. The facility-wide communication system as claimed

in claim 1, wherein the signals include radio frequency signals.

9. The facility-wide communication system as claimed in claim 1, wherein the signals include analog voice signals.

10. The facility-wide communication system as claimed in claim 1, wherein the signals include digital signals.

11. The facility-wide communication system as claimed in claim 4, wherein the one or more peripheral devices are connected using a RS-232 data communications protocol.

12. The facility-wide communication system as claimed in claim 4, wherein the one or more peripheral devices include one of portable computer, sensor, automated equipment.

13. The facility-wide communication system as claimed in claim 2, wherein the plurality of signal lines include:

a signal line to receive a signal representing an intensity of a received radio signal, and if more than one of same signals are received by the signal processor, a signal with the strongest intensity is selected for processing.

14. The facility-wide communication system as claimed in claim 2, wherein the serial communication port includes:

an out-port adapted to receive a connection to an in-port of the another one of the one or more control modules;

an in-port adapted to receive a connection to an out-port of the another one of the one or more control modules.

15. The facility-wide communication system as claimed in claim 2, wherein the out-port includes a buffered connection to the in-port.

16. A powerline communication system, comprising:

a signal processor;

one or more interface connector ports; and

a plurality of signal lines connected from the signal processor to the one or more interface connector ports; and

an AC powerline modem connected to the signal processor via one of the one or more interface connector ports,

wherein the AC powerline modem modulates and demodulates the signals for transmission and reception over the AC powerline to another signal processor.

17. The powerline communication system as claimed in claim 16, the one or more interface connector ports further including:

a connection to a transceiver,

wherein the signals received via the transceiver can be transmitted via the AC powerline modem through the AC powerline to the another signal processor, and the signals received from the another signal processor can be transmitted by the transceiver to propagate the signals within a desired range of area.

18. The powerline communication system as claimed in claim 16, the one or more interface connector ports further including:

a second serial communication port connecting to the transceiver,

wherein the signals can also be received and sent to the transceiver via the second serial communication port.

19. The powerline communication system as claimed in claim 16, the one or more interface connector ports further including:

a third serial communication port connecting to one or more peripheral devices,

wherein the signals transmitted and received by the signal processor can be monitored at the peripheral devices via the third serial communication port.

20. The powerline communication system as claimed in claim 17, wherein the transceiver includes a radio frequency transceiver.

21. The powerline communication system as claimed in claim 17, wherein the connection to a transceiver includes a plurality of connections to a plurality of transceivers, each of the plurality of transceivers enabled to be tuned to a different frequency channel from the rest of the plurality of transceivers, wherein the plurality of transceivers can receive signals of multiple frequencies.

22. The powerline communication system as claimed in claim 17, wherein the one or more interface connector ports include:

a connection to a microphone/speaker connected directly to the signal processor,

wherein signals received at the microphone/speaker can be transmitted via one of the transceiver and AC powerline modem, and signals received at one of the transceiver and AC powerline modem can be transmitted to the microphone/speaker.

23. The powerline communication system as claimed in

claim 22, wherein the microphone/speaker further includes a switch to indicate to the signal processor that a voice signal is being transmitted from the microphone/speaker.

24. The powerline communication system as claimed in claim 16, further including one or more indicator lamps coupled to the signal processor to signal status information of the system.

25. The powerline communication system as claimed in claim 19, wherein the peripheral device includes a personal computer.

26. The powerline communication system as claimed in claim 25, wherein the peripheral device is connected to the signal processor via an RS-232 connector.

27. The powerline communication system as claimed in claim 16, wherein the one or more interface connector ports include a bridging connector to enable bridging to another communication system.

28. The powerline communication system as claimed in claim 27, wherein the bridging connector includes a serial communications port.

29. The powerline communication system as claimed in claim 27, wherein the bridging connector includes a galvanically-isolated RS-232 connector.

30. The powerline communication system as claimed in claim 17, wherein the plurality of signal lines include:

a signal line to receive a signal representing an intensity of a received radio signal from the transceiver.

31. A facility-wide communication system comprising:

a plurality of control modules, each one of the plurality of control modules including:

a signal processor;

one or more RF transceiver interface connector ports coupling the signal processor and one or more RF transceivers, the one or more RF transceivers to receive and broadcast radio frequency signals; and

a communication interface port coupled to the signal processor;

wherein the plurality of control modules are connected to one another with a physical cable at the communication interface port of the plurality of control modules, and the radio frequency signals received at the one or more RF transceivers of one of the plurality of control modules are processed by the signal processor at the one of the plurality of control modules and transmitted via the physical cable to another one of the plurality of control modules where the processed signals are broadcast at the one or more RF transceivers of the another one of the plurality of control modules.

32. A method for bridging powerline networks over separate AC power systems, the method comprising:

connecting a first AC power system with a capacitor bridge to a second AC power system.

33. The method for bridging powerline networks over separate AC power systems as claimed in claim 32, further including:

galvanically isolating the first AC power system and the second AC power system by connecting a third AC power system to the second AC power system using galvanically-

isolated RS-232 serial connection between the second AC power system and the third AC power system.

34. A method for bridging powerline networks over separate AC power systems, comprising:

connecting a first AC power system to a second AC power system via galvanically-isolated serial ports.

35. A through-the-earth communication transceiver subsystem, comprising:

a modulator;

a first amplifier coupled to the modulator to receive a modulated carrier signal from the modulator; and

an antenna coupled to the first amplifier to receive an amplified signal from the first amplifier,

wherein the amplified signal is transmitted via the antenna.

36. The through-the-earth communication transceiver subsystem as claimed in claim 35, wherein the modulator includes a single sideband modulator.

37. The through-the-earth communication transceiver subsystem as claimed in claim 36, further including:

a second amplifier coupled to the single sideband modulator,

wherein the second amplifier receives signals representing voice input and transmits the signals to the single sideband modulator.

38. The through-the-earth communication transceiver subsystem as claimed in claim 37, wherein the second amplifier includes an automatic gain control amplifier.

39. The through-the-earth communication transceiver subsystem as claimed in claim 37, wherein the second amplifier includes an analog gain control amplifier.

40. The through-the-earth communication transceiver subsystem as claimed in claim 37, wherein the second amplifier includes a digital gain controller.

41. The through-the-earth communication transceiver subsystem as claimed in claim 35, wherein the modulator includes a digital signal processor.

41. The through-the-earth communication transceiver subsystem as claimed in claim 35, wherein the modulator includes an analog single sideband modulator.

42. The through-the-earth communication transceiver subsystem as claimed in claim 35, the first amplifier includes:

a preamplifier to receive signal from the single sideband modulator; and

a power bridge amplifier coupled to the preamplifier and the antenna,

wherein the power bridge amplifier receives the signal amplified by the preamplifier and applies the signal to the antenna with current.

43. The through-the-earth communication transceiver subsystem as claimed in claim 35, further including a microphone coupled to the second amplifier to receive voice input and to transmit the signals representing voice input to the second amplifier.

44. The through-the-earth communication transceiver

subsystem as claimed in claim 35, wherein the modulator includes a frequency-shift-keying modulator.

45. The through-the-earth communication transceiver subsystem as claimed in claim 35, wherein the modulator includes a phase-shift-keying modulator.

46. The through-the-earth communication transceiver subsystem as claimed in claim 35, wherein the modulator includes a quadrature phase-shift-keying modulator.

47. The through-the-earth communication transceiver subsystem as claimed in claim 35, further including:

a sensor coupled to the modulator to receive data input into the transceiver subsystem.

48. The through-the-earth communication transceiver subsystem as claimed in claim 35, further including:

a PC coupled to the modulator.

49. The through-the-earth communication transceiver subsystem as claimed in claim 35, further including:

a transducer coupled to the modulator.

50. A through-the-earth communication transceiver subsystem, comprising:

an antenna;

a signal processor coupled to the antenna,

wherein a signal received by the antenna is processed in the signal processor.

51. The through-the-earth communication transceiver subsystem as claimed in claim 50, the subsystem further including a demodulator coupled to the signal processor,

wherein the signal is demodulated.

52. The through-the-earth communication transceiver subsystem as claimed in claim 50, the subsystem further including a filter coupled to the signal processor, wherein the signal is filtered to be within a predetermined range.

53. The through-the-earth communication transceiver subsystem as claimed in claim 52, wherein the filter is a passive filter.

54. The through-the-earth communication transceiver subsystem as claimed in claim 53, wherein the subsystem further includes an active filter coupled to the passive filter.

55. The through-the-earth communication transceiver subsystem as claimed in claim 50, wherein the signal processor further includes a comb filter coupled to the signal processor, the comb filter enabled to track drifting noise of selected frequency and their harmonics.

56. The through-the-earth communication transceiver subsystem as claimed in claim 50, wherein the signal processor further includes a tracking comb filter coupled to the signal processor, the tracking comb filter enabled to track drifting noise of selected frequency and their harmonics.

57. The through-the-earth communication transceiver subsystem as claimed in claim 50, further including:

an output device coupled to the signal processor to receive the signals.

58. The through-the-earth communication transceiver subsystem as claimed in claim 57, wherein the output device is a speaker.

59. The through-the-earth communication transceiver subsystem as claimed in claim 57, wherein the output device is a personal computer.

60. The through-the-earth communication transceiver subsystem as claimed in claim 50, further including a relay coupled to the antenna, the relay enabled to connect and disconnect the antenna from coupling with the signal processor.

61. The through-the-earth communication transceiver subsystem as claimed in claim 60, further including a switch coupled to the relay to control the relay.

62. The through-the-earth communication transceiver subsystem as claimed in claim 35, further including a relay coupled to the antenna, the relay enabled to connect and disconnect the antenna from coupling with the first amplifier.

63. The through-the-earth communication transceiver subsystem as claimed in claim 50, further including a wire-hose enclosing the antenna.

64. A method of communicating signals in the areas where obstructions impeding communication exist, comprising:

receiving a signal to communicate;

converting the signal into a single sideband modulated carrier signal;

applying the single sideband modulated carrier signal to an antenna; and

transmitting the single sideband modulated carrier signal.

65. A method of communicating signals in the areas where obstructions impeding communication exist, comprising:

receiving a single sideband modulated carrier signal;

demodulating the single sideband modulated carrier signal;

applying the demodulated single sideband modulated carrier signal to an output device,

wherein the demodulated single sideband modulated carrier signal to an output device is converted to at least one of audible speech and displayable information.

66. The method of communicating signals in the areas where obstructions impeding communication exist as claimed in claim 65, further including:

filtering the single sideband modulated carrier signal within a predetermined frequency range to remove undesirable noise.

67. The method of communicating signals in the areas where obstructions impeding communication exist as claimed in claim 65, further including:

tracking drifting harmonics of the single sideband modulated carrier signal to attenuate the harmonics.

68. The facility-wide communication system as claimed in claim 1, wherein at least one of the one or more interfaces includes through-the-earth transceiver interface.

69. The through-the-earth communication transceiver subsystem as claimed in claim 35, wherein the antenna includes a loop antenna.

70. The through-the-earth communication transceiver subsystem as claimed in claim 50, wherein the antenna includes a loop antenna.

71. The through-the-earth communication transceiver subsystem as claimed in claim 55, wherein the selected frequency includes one of 50 Hz and 60 Hz.

72. The facility-wide communication system as claimed in claim 2, wherein the transceiver further includes an antenna to receive and transmit signals.

73. The facility-wide communication system as claimed in claim 2, wherein the transceiver further includes:

a receiving antenna to receive signals; and

a transmitting antenna to transmit signals.

74. The powerline communication system as claimed in claim 17, wherein the transceiver further includes an antenna to receive and transmit signals.

75. The powerline communication system as claimed in claim 17, wherein the transceiver further includes:

a receiving antenna to receive signals; and

a transmitting antenna to transmit signals.